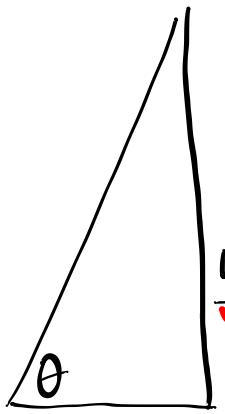
3.7/9)

1) Pic
2) Eqn
3) $\frac{d}{dt}$
4) sub



② $\tan\theta = \frac{y}{x}$

③ $\sec^2\theta \cdot \frac{d\theta}{dt} = \frac{\frac{dy}{dt}x - y\frac{dx}{dt}}{x^2}$

④ $x=2 \quad \frac{dx}{dt}=1$

$y=2 \quad \frac{dy}{dt}=-\frac{1}{4}$

$\cos\theta = \frac{2}{\sqrt{8}}$

$\sec\theta = \frac{\sqrt{8}}{2}$

$\sec^2\theta = \frac{8}{4} = 2$

3.7/12+1

1) pic
2) Eq
3) $\frac{d}{dt}$
4) sub

given $\frac{dA}{dt} = 6 \frac{mi^2}{h}$

② $A = \pi r^2$

③ $\frac{dA}{dt} = \pi\left(2r \frac{dr}{dt}\right)$?

4) $A = 9 mi^2$

$A = \pi r^2$

$9 = \pi r^2$

$\sqrt{\frac{9}{\pi}} = r$

④ $6 = \pi\left(2\sqrt{\frac{9}{\pi}}\right)\frac{dr}{dt}$

$6 = 2\sqrt{9\pi}\,\frac{dr}{dt}$

$\left(\frac{mi}{hr}\right)\frac{1}{\sqrt{\pi}} = \frac{dr}{dt}$

$\frac{\pi}{\sqrt{\pi}} = \frac{\pi^1}{\pi^{1/2}}$

$= \pi^{1-\frac{1}{2}} = \pi^{1/2}$

$= \sqrt{\pi}$

5.2

Extremum (Extrema)

relative maxima

relative minima

1st deriv test

2ND deriv test

3.8

local linear approximation

use of tangent lines to approximate values of fns.

trig review

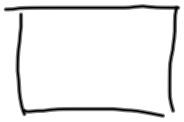
unit circle

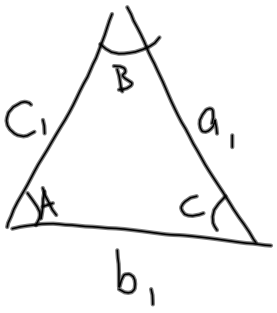
graphs

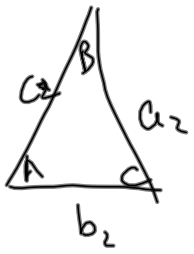
correspondences.

Trig Review

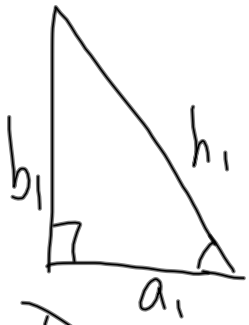
Beginning: similar △s

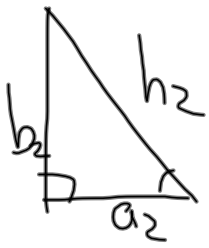






$$\frac{C_1}{C_2} = \frac{b_1}{b_2} = \frac{a_1}{a_2} \quad \cdots\cdots$$





$$\frac{h_1}{h_2} = \frac{a_1}{a_2} \neq \frac{b_1}{b_2}$$

$$a_1 b_2 = a_2 b_1$$

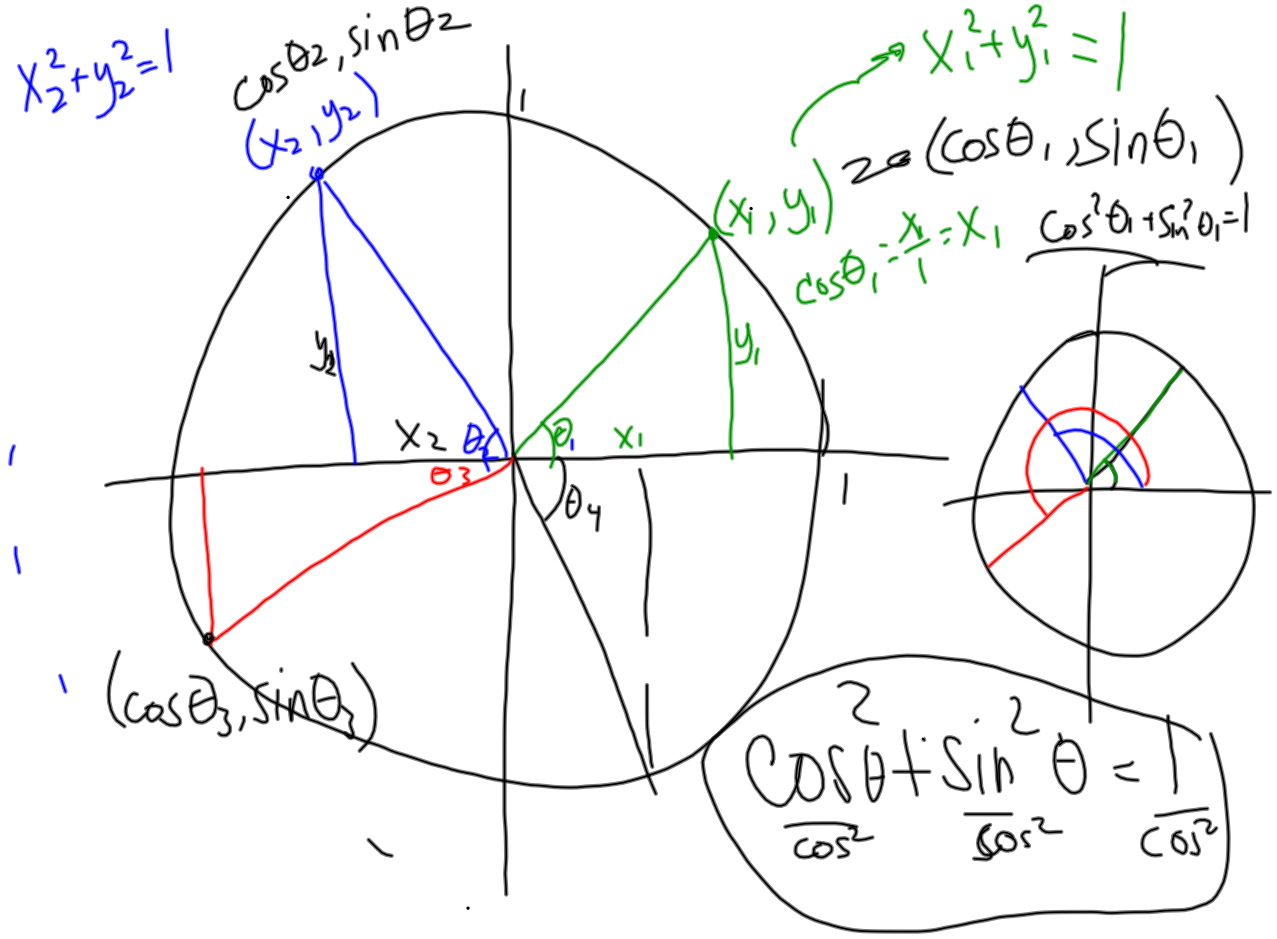
$$\frac{a_1}{b_1} = \frac{a_2}{b_2}$$

d Δ trig

$\sin\theta = \frac{o}{h}$ $\csc\theta = \frac{h}{o}$

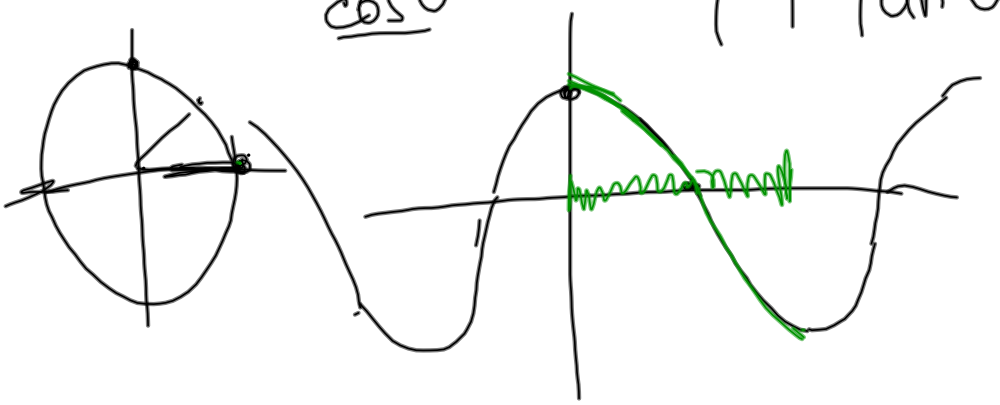
$\cos\theta = \frac{a}{h}$ $\sec\theta = \frac{h}{a}$

$\tan\theta = \frac{o}{a}$ $\cot\theta = \frac{a}{o}$

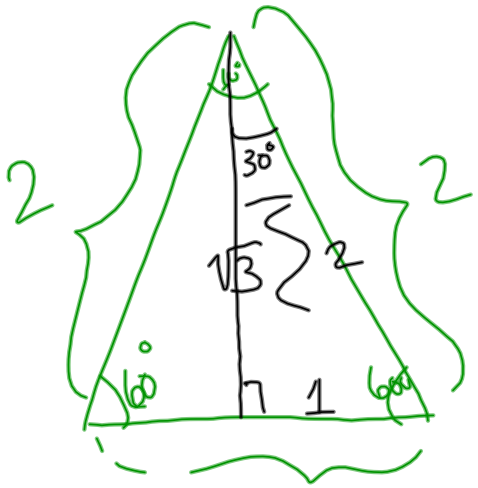


$\cos\theta$

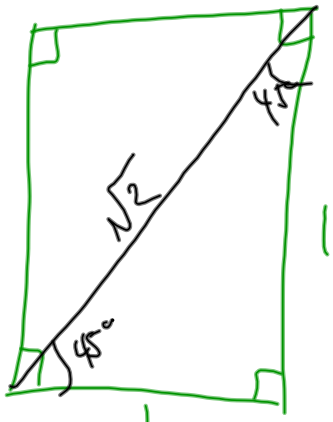
$1+\tan^2\theta=\sec^2\theta$



Special Triangles



$$\cos 30^\circ = \frac{\sqrt{3}}{2}$$



$$\sin 45^\circ = \frac{1}{\sqrt{2}}$$

51/20) $y = x^{2/3}$

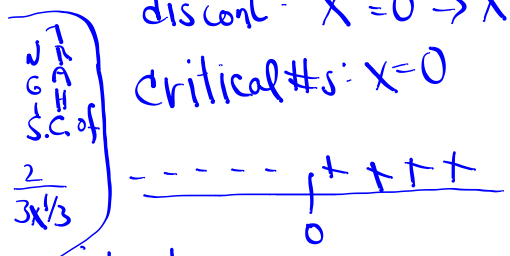
find y' technique $y' = \frac{2}{3}x^{-1/3} = \frac{2}{3x^{1/3}}$

find crit pts: zeros? none

discont? $x^{1/3} = 0 \Rightarrow x = 0$

critical #s: $x = 0$

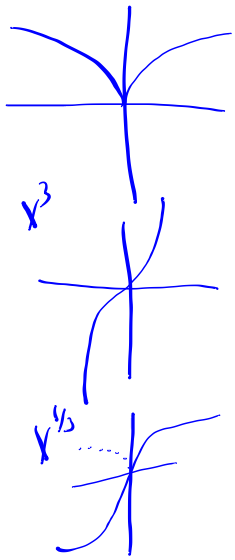
VIA G.H. S.C. of $\frac{2}{3x^{1/3}}$



interpret sign chart

$f(x)$ inc on $[0, \infty)$

$f(x)$ dec on $(-\infty, 0]$



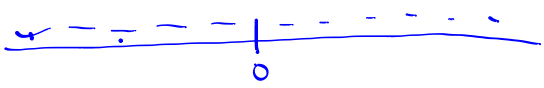
$y' = \frac{2}{3}x^{-1/3}$

$y'' = -\frac{2}{9}x^{-\frac{4}{3}} = \frac{-2}{9x^{4/3}}$

Zeros: still NEIN

discont: $x^{4/3} = 0 \Rightarrow x = 0$

sign chart $\frac{-2}{9x^{4/3}}$



interpretation

concave Down everywhere (except 0)

POINTS OF INFLECTION

none

5.1/22

$y = x^{4/3} - x^{1/3}$

$y' = \frac{4}{3}x^{1/3} - \frac{1}{3}x^{-2/3} \overset{\text{set}}{=} 0$

$= \frac{1}{3}x^{-2/3}\left[4x - 1\right] = 0$

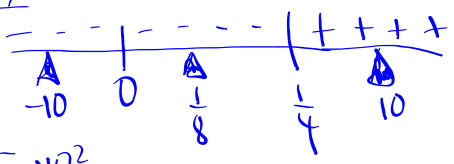
zeros

$4x - 1 = 0 \quad \therefore x = \frac{1}{4}$

disc

$x^{2/3} = 0 \quad \therefore x = 0$

$y' = \frac{\frac{1}{3}(4x-1)}{x^{2/3}}$



$(-10)^{2/3} = \left[(-10)^{1/3}\right]^2$

$= [-2.\ldots]^2 = 4.\ldots$

$y' = \frac{1}{3}(4x-1)x^{-2/3}$

$y'' = \frac{1}{3}\left[4x^{-2/3} + (4x-1)\left(-\frac{2}{3}x^{-5/3}\right)\right]$

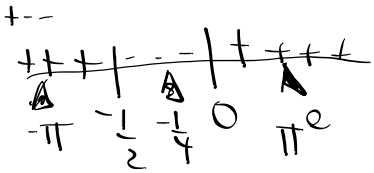
$= \frac{2}{3}x^{-5/3}\left[2x + (4x-1)\left(-\frac{1}{3}\right)\right]$

$= \frac{2}{3}x^{-5/3}\left[\frac{2}{3}x + \frac{1}{3}\right] = 0$

zeros $x = -\frac{1}{2}$ disc $x = 0$ $\frac{2}{3}x + \frac{1}{3} = 0$

$\frac{2x+1}{3} = 0$

$x = -\frac{1}{2}$

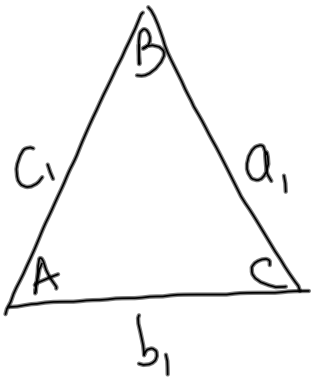


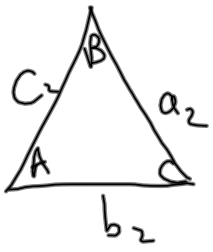
interpretation

Conc. up $(-\infty, -\frac{1}{2}) \cup (0, \infty)$

Conc dn $(-\frac{1}{2}, 0)$

Trig Review... the beginning



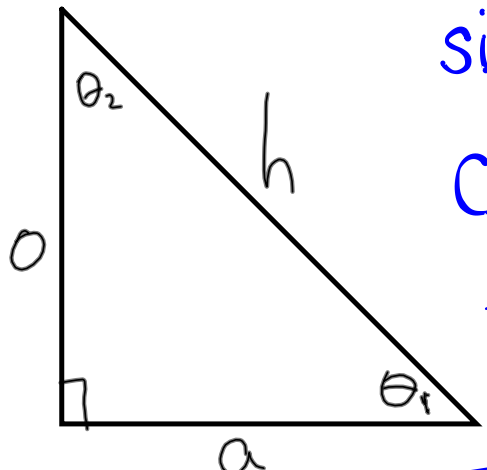


$$\frac{c_1}{c_2} = \frac{b_1}{b_2} = \frac{a_1}{a_2}$$

$$\frac{a_1}{a_2} = \frac{b_1}{b_2} \iff a_1 b_2 = a_2 b_1$$

$$\frac{a_1}{b_1} = \frac{a_2}{b_2}$$

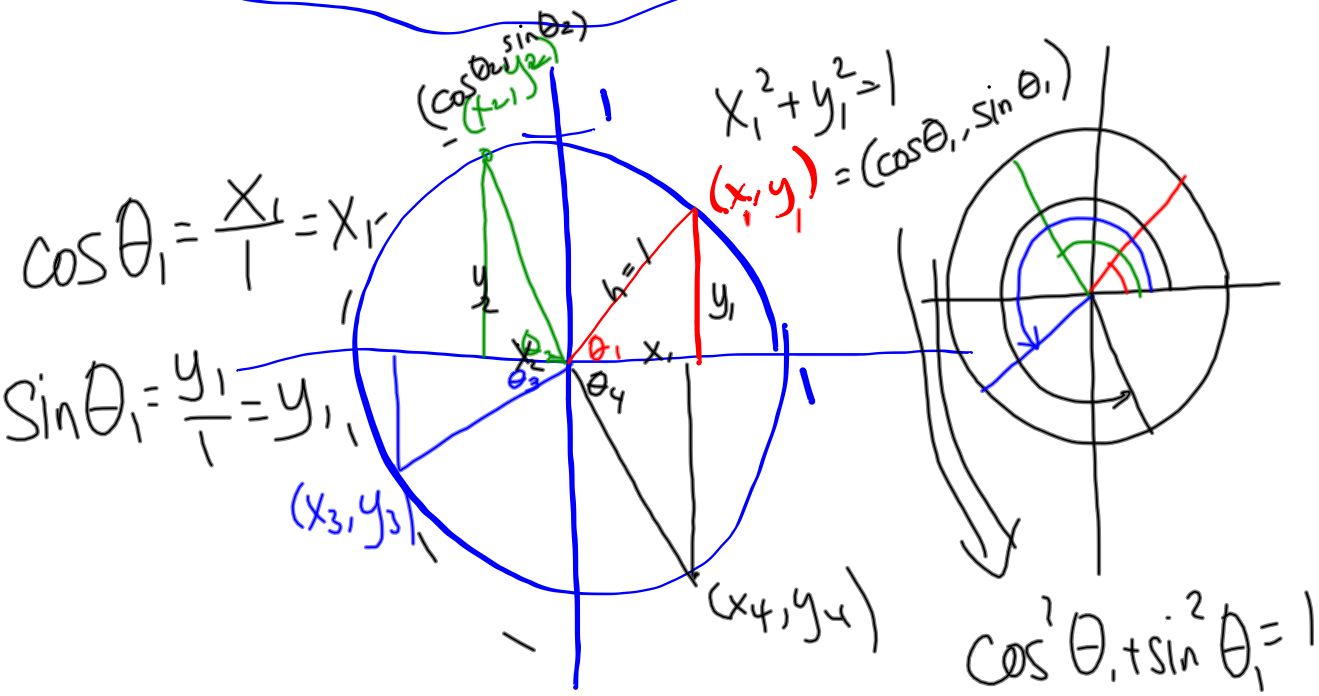
Trig



$\sin\theta_1 = \frac{o}{h}$ $\csc\theta_1 = \frac{h}{o}$

$\cos\theta_1 = \frac{a}{h}$ $\sec\theta_1 = \frac{h}{a}$

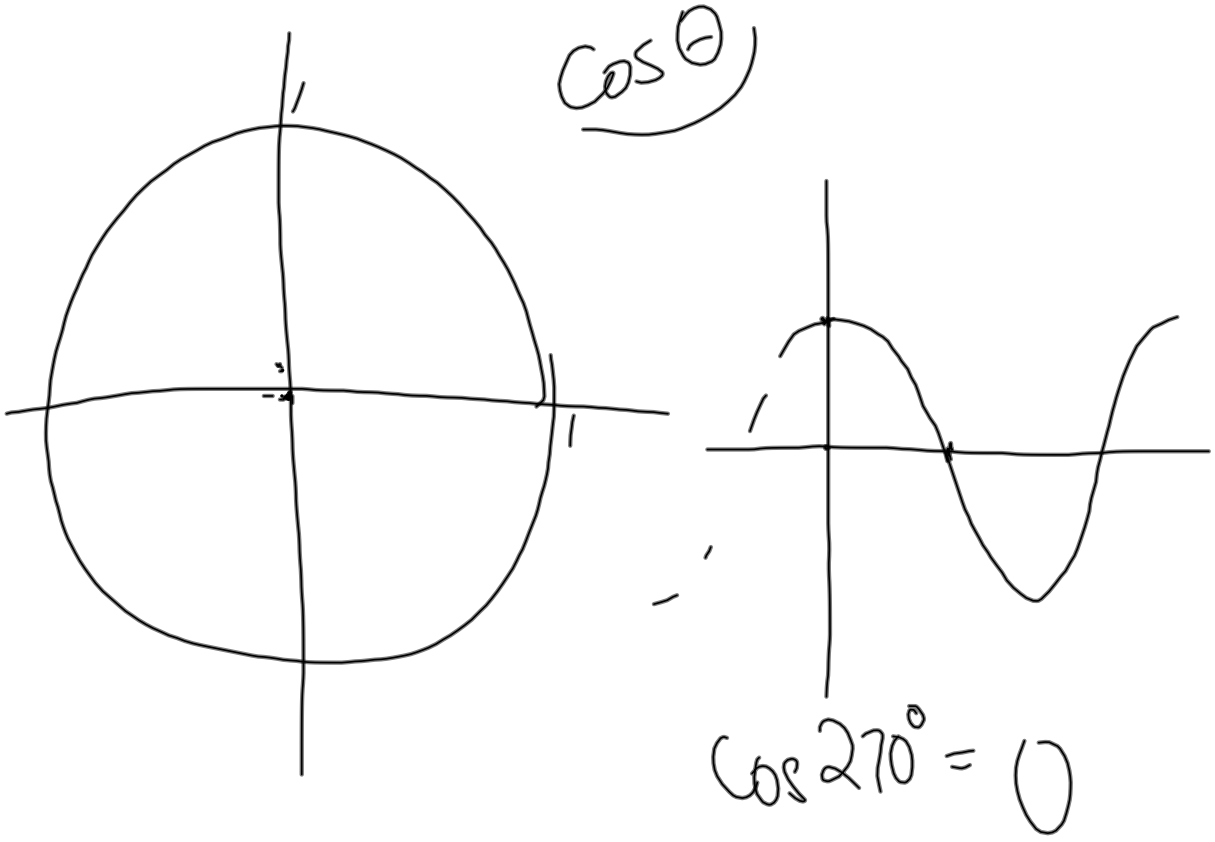
$\tan\theta_1 = \frac{o}{a}$ $\cot\theta_1 = \frac{a}{o}$



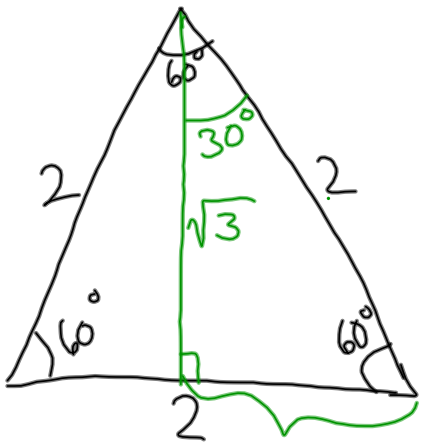
CORRESPONDENCE

$\cos\theta \simeq$ X-coord

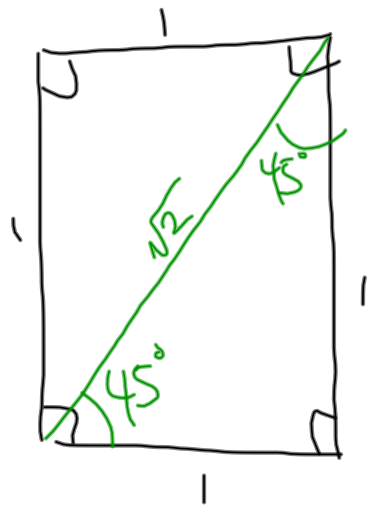
$\sin\theta \simeq$ y-coord


Cos θ
1
1
Cos 270° = 0

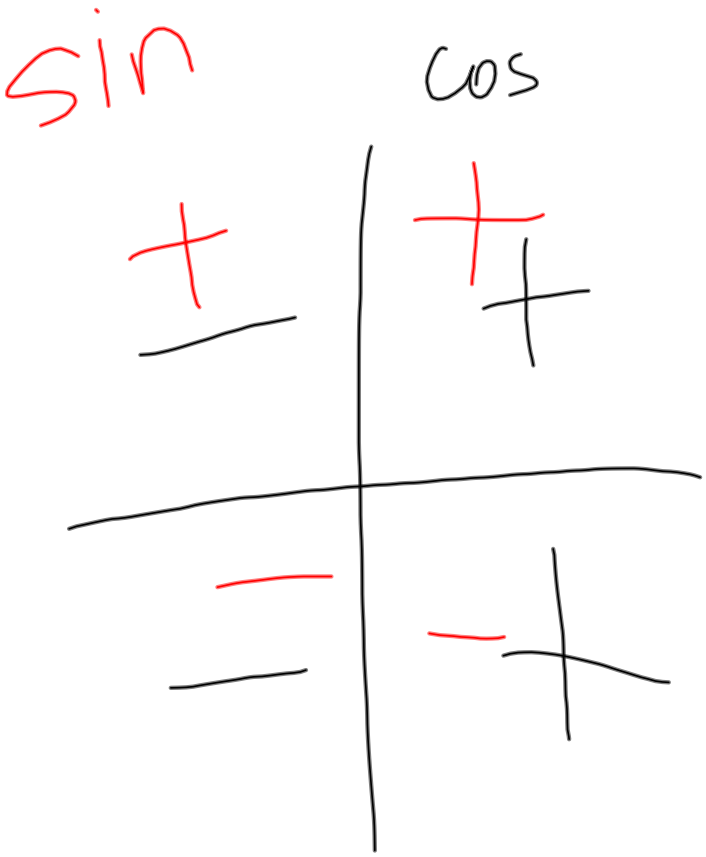
Special Triangles

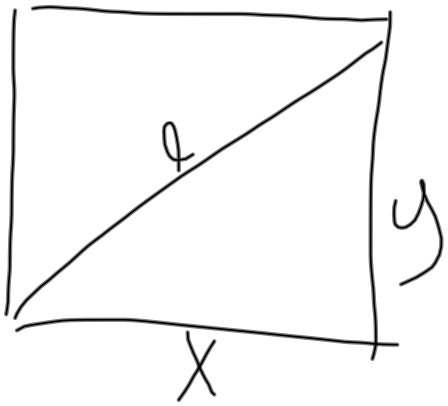


$\cos 30° = \frac{\sqrt{3}}{2}$



$\sin 45° = \frac{1}{\sqrt{2}}$


sin
cos
+
+
+
−
−
−
+



$$d^2 = x^2 + y^2$$

$$d = \sqrt{x^2 + y^2}$$